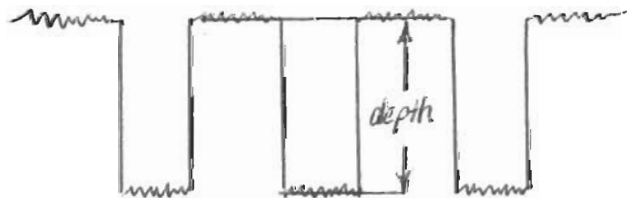


DIRECTORATE OF METROLOGY  
PURCHASE DESCRIPTION  
SURFACE FINISH TESTER

- 1.0 Scope:** The Surface Finish Tester will be designed for table top operation. It will be capable of measuring depth of scratch and surface roughness parameters. It shall be capable of mastering on a roughness standard from NIST and measuring a test roughness standard from a customer.
- 2.0 Components:** A surface finish tester, linear traversing unit, assorted pickups/ probes, holding devices, support table, and a controller.
- 3.0 Salient Characteristics:** The Surface Finish Tester shall consist of the following performance requirements and product characteristics.
- 3.1 Units:** The surface finish tester shall be capable of measuring and displaying values in both English and metric units.
- 3.2 Surface Finish Measurement Uncertainty:** The measurement uncertainty of surface finish measurements shall not exceed 2% of measured value + 0.16  $\mu\text{in}$  (ex for 32  $\mu\text{inch}$  scratch the uncertainty would be 0.8  $\mu\text{inch}$ ).
- 3.3 Resolution:** The resolution shall be at least 0.8 nm @10 mm (0.03  $\mu\text{in}$  @ 0.39 in) range.
- 3.4 Functional Requirements:** The surface finish tester shall provide a precise analysis of surface finish and depth of scratch. It shall be capable of analyzing three scratches and calculating the average depth of middle scratch. As seen below.



This result shall also be capable of being graphed and printed out. The depths range from 10 to 200  $\mu\text{inches}$ . It shall be capable of managing, storing and evaluating all surface finish measuring parameters as well as for the controlling of the measuring functions.

- 3.5 Traverse Length:** The traverse length shall be at a minimum 0.1 mm (0.004 inch) and a maximum 120 mm (4.72 inch).
- 3.6 Linear Traversing Length:** The linear traversing unit shall have a straightness of travel of 0.005 mm in 120 mm of travel in the Z direction along X axis and 0.001 mm in 120 mm of travel in Y direction along X axis. The automatic return of the traversing unit to the starting point shall have an accuracy of +/- 0.005 mm. The linear traversing unit shall be capable of both manual and automatic modes.
- 3.7 Tracing Speed:** There shall be at least one tracing speed of 0.5 mm/s (0.02 in/s).
- 3.8 Cut-Off:** The minimum cut-off ranges shall be 0.08, 0.25, 0.8, 2.5 and 8 mm (0.003, 0.01, 0.03, 0.1, and 0.3 in).
- 3.9 Filters:** The minimum filters shall be Digital 2CR(75%), 2CR(50%) and Gaussian 2CR-PC(50%).
- 3.10 Roughness Parameters:** The minimum roughness parameters shall be: Ra, Rq, Rp, Rv, Rt, Rpi, Rpm, Rti, Rz, Rmax, and minimum functions: RSM, ADF, PSD, and ACF, and BAC.
- 3.11 Pick-ups/Probes:** The conical diamond stylus shall have a radius of 2, 5, or 10  $\mu\text{m}$  (80, 200, or 400  $\mu\text{inches}$ ), with corresponding measuring force of 1mN. The unit shall be a profiling, contact, skidless instrument. The conical stylus shall incorporate an included angle of 60° or 90°. The unit shall have a laser interferometric pick-up.
- 3.12 Support Table:** The support table shall be capable of holding the components of this unit and shall have a maximum table top size of 36 x 60 inches. It shall be stable in design so that the system uncertainty can be met during operation. It shall also have drawers for holding all necessary accessories.
- 3.13 Controller:** The contractor shall provide a controller. It shall be either a Personal Computer with a 17 inch flat screen Monitor with at least 1280 x 1024 resolution or a portable Laptop Computer with a 12.1-in WXGA. It shall have as a minimum 160 GB of internal memory on the hard drive for a personal computer or a minimum 80GB of internal memory for a Laptop Computer and CDRW drive.
- 3.14 Software:** The contractor shall provide a computer/ software/ menu driven using Windows 2000 based operating system.
- 3.15 Keyboard:** The unit shall have a QWERTY keyboard with numeric pad and standard two button optical mouse with scroll or portable Laptop Computer with a touch pad mouse.

**3.16 Printer:** The unit shall have a color inkjet printer with at least 720 dpi resolution.

**4.0 Testing:** The surface finish tester will be inspected and accepted at destination as specified elsewhere in this contract. The surface finish tester will be checked to assure specified performance requirements are met. Test equipment used will have first echelon certification directly traceable to the National Institute of Standards and Technology (NIST) where required. Tests will be performed to assure the surface finish tester meets the requirements of paragraph 3.1 to 3.16 of this purchase description. A surface finish standard calibrated at NIST will be used to verify the requirements of the comparator. Such testing at destination does not relieve the contractor of performing all inspection and quality checks at the point of fabrication, or as necessary to assure performance as specified herein.

1 Attachment: Data Requirements

**MANUALS:** A complete user and service manual and calibration procedure shall be provided with each unit in contractor format. Manuals shall be on CD-ROM in Indexed Portable Document Format (iPDF). The manuals shall comply with Data Item Description (DID) DI-TMSS-80527A and the Contract Data Requirements List (DD Form 1423).

**SOFTWARE USER MANUAL:** The software user manual shall contain instructions to execute one or more related computer software configuration items. If available, the software user manual shall be provided on CD-ROM in Indexed Portable Document Format (iPDF) and prepared in accordance with Data Item Description DI-IPSC-81443A and Contract Data Requirements List (DD Form 1423).

**SOFTWARE TEST REPORT:** The software test report shall document the results of the validation/verification performed on initial unit and upon any hardware or software configuration change. A copy of the software test report shall be shipped with the unit. The software test report shall be prepared in accordance with Data Item Description DI-IPSC-81440A and Contract Data Requirements List (DD Form 1423).

**SOFTWARE TEST PLAN:** The software test plan shall be delivered with the unit. The test plan shall detail the criteria, performance objectives, and description of tests to be performed. The plan shall be prepared in accordance with Data Item Description DI-IPSC-81438A and Contract Data Requirements List (DD Form 1423).